Claims:

1. A catalyst composition for catalyzing a reaction selected from the group consisting of oxidation, hydrogenation, dehydrogenation, oxidative-hydrogenation, and oxidative-dehydrogenation, which catalyst composition is comprised of graphitic nanostructures which nanostructures are comprised of a plurality of graphite platelets aligned parallel, perpendicular, or at an angle to the longitudinal axis of the nanostructure and which graphitic nanostructures wherein at least about 50% of its edge sites are exposed.

2. The catalyst composition of claim 1 wherein at least about 95% of the edge sites of said nanostructures are exposed.

3. The catalyst composition of claim 1 wherein the graphite nanostructure is one wherein the graphite platelets are aligned substantially parallel to the longitudinal axis of the nanostructure.

4. The catalyst composition of claim 1 wherein the graphite platelets are aligned substantially perpendicular to the longitudinal axis of the graphite nanostructure.

5. The catalyst composition of claim 1 wherein at least about 95% of its edge sites of the nanostructures are exposed and wherein its graphite platelets of the nanostructures are aligned substantially parallel to the longitudinal axis of the nanostructure.

6. A method for activating a catalyst composition for catalyzing a reaction selected from the group consisting of oxidation, hydrogenation, dehydrogenation, oxidative-hydrogenation, and oxidative-dehydrogenation, which catalyst composition is comprised of graphitic nanostructures which nanostructures are comprised of a plurality of graphite platelets aligned parallel, perpendicular, or at an angle to the longitudinal axis of the nanostructure and which graphitic nanostructures wherein at least about 50% of its edge sites are exposed, which method for activating comprises treating said nanostructures with a mixture of CO_2 and H_2 at an effective temperature for period of time from about 0.5 hours to about 70 hours.

7. The method of claim 6 wherein at least about 95% of the edge sites of said nanostrcuctures are exposed.

8. The method of claim 6 wherein the graphite nanostructure is one wherein the graphite platelets are aligned substantially parallel to the longitudinal axis of the nanostructure.

9. The method of claim 6 wherein the graphite platelets are aligned substantially perpendicular to the longitudinal axis of the graphite nanostructure.

10. The method of claim 6 wherein at least about 95% of its edge sites of the nanostructures are exposed and wherein its graphite platelets of the nanostructures are aligned substantially parallel to the longitudinal axis of the nanostructure.

11. A catalytic process selected from oxidation, hydrogenation, dehydrogenation, oxidative-hydrogenation, and oxidative-dehydrogenation which is catalyzed by a catalyst composition comprised of graphitic nanostructures which nanostructures are comprised of a plurality of graphite platelets aligned parallel, perpendicular, or at an angle to the longitudinal axis of the nanostructure and wherein at least about 50% of the edge sites of said nanostructures are exposed.

12. The catalytic process of claim 11 wherein at least about 95% of the edge sites of said nanostructures are exposed.

13. The catalytic process of claim 11 which is the reaction of CO and H_2O in the presence of said graphitic nanostructures to produce H_2 and CO_2.

14. The catalytic process of claim 11 which is the reaction of N_2O in the presence of said graphitic nanostructures to produce N_2 and O_2.

15. The catalytic process of claim 11 which is the reaction of N_2O and CO in the presence of said graphitic nanostructures to produce N_2 and CO_2.

16. The catalytic process of claim 11 which is the reaction of SO_2 in the presence of said graphitic nanostructures to produce SO_3.

17. The catalytic process of claim 11 wherein the graphite nanostructure is one wherein the graphite platelets are aligned substantially parallel to the longitudinal axis of the nanostructure.

18. The catalytic process of claim 11 wherein the graphite platelets are aligned substantially perpendicular to the longitudinal axis of the graphite nanostructure.

19. The catalytic process of claim 11 wherein at least about 95% of its edge sites of the nanostructures are exposed and wherein its graphite platelets of the nanostructures are aligned substantially parallel to the longitudinal axis of the nanostructure.

20. A catalytic process for converting ethylbenzene to styrene which process comprises contacting ethylbenzene with oxygen at a temperature from about 350°C to about 450°C in the presence of a catalyst composition comprised of graphitic nanostructures which nanostructures are comprised of a plurality of graphite platelets aligned parallel, perpendicular, or at an angle to the longitudinal axis of the nanostructure and wherein at least about 50% of the edge sites of said nanostructures are exposed.

21. The process of claim 20 wherein at least about 95% of the edge sites of said nanostructures are exposed.

22. The process of claim 20 wherein the graphite nanostructure is one wherein the graphite platelets are aligned substantially parallel to the longitudinal axis of the nanostructure.

23. The process of claim 20 wherein the graphite platelets are aligned substantially perpendicular to the longitudinal axis of the graphite nanostructure.

24. The process of claim 20 wherein at least about 95% of its edge sites of the nanostructures are exposed and wherein its graphite platelets of the nanostructures are aligned substantially parallel to the longitudinal axis of the nanostructure.

25. A catalytic process for converting CO_2 to CO and water, which process comprises reacting CO_2 and hydrogen in the presence of a graphitic nanostructure catalyst composition at a temperature from about 400°C to about 475°C, which graphitic nanostructure catalyst composition comprised of graphitic nanostructures which nanostructures are comprised of a plurality of graphite platelets aligned parallel, perpendicular, or at an angle to the longitudinal axis of the nanostructure and wherein at least about 50% of the edge sites of said nanostructures are exposed.

26. The catalytic process of claim 25 wherein at least about 95% of the edge sites of said nanostructures are exposed.

27. The catalytic process of claim 25 wherein the graphite nanostructure is one wherein the graphite platelets are aligned substantially parallel to the longitudinal axis of the nanostructure.

28. The catalytic process of claim 25 wherein the graphite platelets are aligned substantially perpendicular to the longitudinal axis of the graphite nanostructure.

29. The catalytic process of claim 25 wherein at least about 95% of its edge sites of the nanostructures are exposed and wherein its graphite platelets of the nanostructures are aligned substantially parallel to the longitudinal axis of the nanostructure.